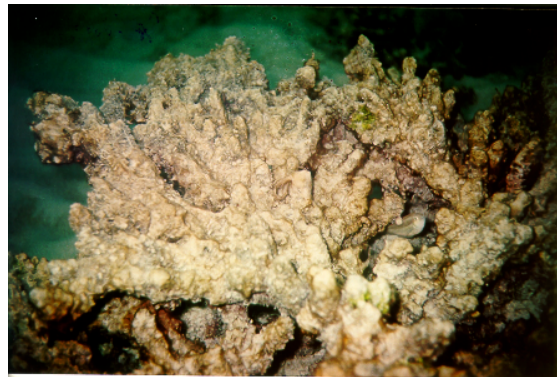
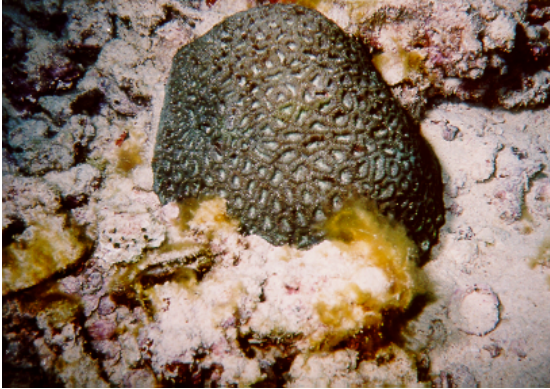




مدينة راس لافان الصناعية  
RAS LAFFAN INDUSTRIAL CITY

**Distribution of Coral Reefs Around the Coastal Areas of Ras Laffan Industrial City, Qatar  
(Arabian Gulf)**



# Distribution of Coral Reefs Around the Coastal Areas of Ras Laffan Industrial City, Qatar (Arabian Gulf)

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## Abstract

A marine ecological survey was carried along the marine areas of Ras Laffan Industrial City to assess the biodiversity and distribution of corals around Ras Laffan Industrial City. Sediment core samples were collected and analysed for grain size analyses, water samples were collected and analysed for chemical parameters, depth was recorded and corals were photographed by SCUBA divers. Data was analysed to prepare coral distribution map for Ras Laffan.

**Key Words:** Ras Laffan, Coral, Coastal Development, Sediments, Biodiversity

## Introduction

Ras Laffan Industrial City (RLC) is situated on the Northeastern side of Qatar along the Arabian Gulf in the State of Qatar occupying an area of 106 km<sup>2</sup> (Figure 1). Due to the prevailing geological, meteorological and oceanographic conditions, the coastal marine areas of Ras Laffan Industrial City are regarded as special marine environment. A combination of shallow waters, high temperature and salinity and other oceanographic features such as current and wave action exert their pressure on the marine ecosystem. Ras Laffan Industrial City has a coastline of 9 km on the northern side and 5 km on the eastern side.



**Figure 1: Location of Ras Laffan Industrial City**

A coral barrier extends parallel to the RLC northern coastline at a distance of some 500m from the shore, which is visible on satellite photographs of the area (Figure 2) . The results of the sampling programme (SARC, 2000) conducted during June 2000, showed the structure to be dead with blocks of dead corals present on both sides of Ras Laffan port. It is believed that these corals have been dead for some time. Species identified during the survey include *Acropora* spp., *Platygra* spp., and *Favorites* spp. However, whilst the coral is dead, the structure still plays an important role in the formation of the nearshore lagoon and in the protection of the shoreline from excessive wave energy (SARC, 2000d). The structure also forms a hard substrate for fixed flora (algae) and fauna (sponges, oysters, worms), making the area a rich food resource for coral reef species as crabs, urchins, cuttle-fishes and fish.

Similarly, the Hunting Surveys Limited (1985) Pipeline Route Survey extended from the North Field, approximately 85 km offshore, to a location 1.5 km offshore of a landfall point approximately 675 m north of the Ras Laffan Lighthouse. This survey showed coral fragments and calcareous sand from 1.5 to 2.5 km offshore, followed by a 500-m wide band described from side-scan sonar records as a zone where coral growths occurred on the substrate surface. The depth at this location, approximately 3 km from shore, was 10 m. The 10-m depth range continued until approximately 5.5 km from shore. The remainder of the sea floor within the 10-m depth range (3.0 to 5.5 km from shore) was described as medium calcareous sand with shell fragments (Hunting Surveys Limited, 1985).

## Methodology

In 2002 a marine ecological survey was initiated to assess change in biodiversity of the coastal areas of RLC and the location of the sampling sites is shown in Figure 3.

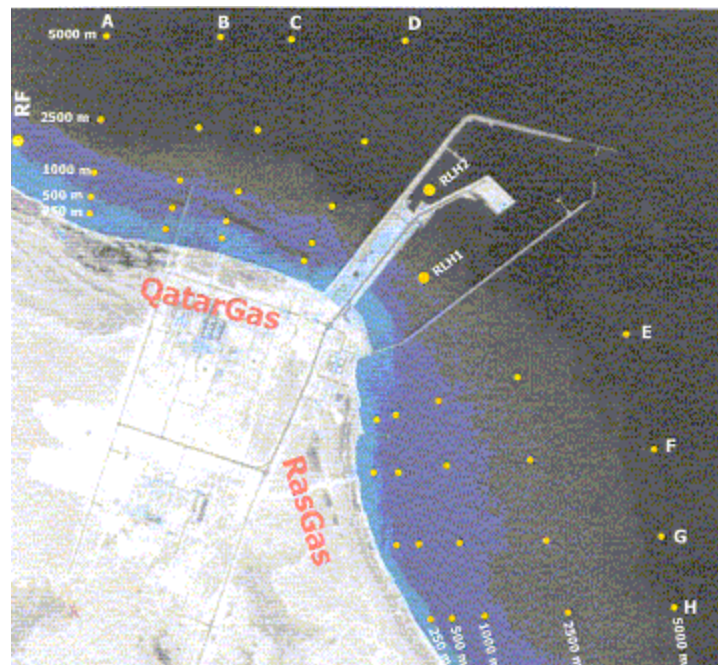


Figure 3: Location of Ecological Survey Stations



## Methodology

Sediment, water and biota samples were collected from sampling locations by SCUBA diving. Due to heterogeneity in the distribution of the organisms samples from three different squares of the quadrat (1m x 1 m) lying flat at the bottom. The quantity of sediment sample collected was measured in a graduated cylinder for total volume or with electronic balance for weight. Each sample was split into 3 portions. Approximately one-third of sediment was transferred to stick-on-plastic bags for the grain size analysis. Formaldehyde was added to all the samples assigned for qualitative analysis. The sampling equipment was washed in a tub with filtered sea water. The material retained on the screen or sieves was transferred to polyethylene bags. The pre-labeled containers or bags were then placed in an icebox. In some cases where the substrata were too hard, portions of rocks and coral reefs were also collected. All the samples of sediment, biota etc. after initial on-board-processing were frozen in an ice bath and finally shifted to deep freezer at  $-20^{\circ}\text{C}$  within 3-4 hours of sample collection. All these samples were kept at  $-20^{\circ}\text{C}$  until final transportation to the laboratories.

The grain size analysis was carried by drying the sand on blotting papers at room temperature for 2 days. The dried sediment (100 gm) was weighed on a Galaxy 400 balance and sieved over a set of nested sieves of appropriate mesh size under vibration for 15 minutes. The separated fractions on each sieve were carefully transferred to a dish for weighing and the percentage of different fractions was calculated. Prior to collecting any samples the site was photographed and video filmed.

## Results and Discussion

### Northern Coastal Areas

*Acropora sp.*, *Antipathes sp.*, *Favia sp.*, *Favites sp.*, *Pocillopora sp.*, and *Turbinaria sp.* were found along the northern coastal areas.

*Acropora sp.* was found at Station Nos. A1000, B500 and D250 in water depths ranging from 0.5 to 10 meters. Seabed sediments at these stations were characterised as very fine sand to coarse silt, coarse to medium sand, and medium to fine sand respectively. *Antipathes sp.* was observed at Station No. C 500 where water depth was approximately 2 meters and sediment were composed of medium and fine sand. *Favia sp.* was found at Station Nos. A2500, B2500, C2500 and D2500 where water depths ranged from 1 to 10 meters and sediments were characterised as fine to very fine sand, fine to very fine sand, and medium to fine sand respectively. *Favites sp.* was observed only at Station No. A2500 in water depth of 1 meter and sediments were fine to very fine sandy in nature. *Pocillopora sp.* was found at Station Nos. B250, C1000 and D1000 situated in water depths from 2 to 9 meters. At these stations the sediments were very fine to coarse silt, medium to fine sand and medium sandy in nature. *Turbinaria sp.* was observed at Station Nos. A1000, A5000, C500 and C1000 in water depths ranging from 0.5 to 2 meters. At these stations the sediments were made up of very fine sand, fine to very fine sand, medium sand, and medium to very fine sand respectively.

### Eastern Coastal Areas

*Acropora sp.*, *Favia sp.*, *Favites sp.*, *Goniastrea sp.*, *Pocillopora sp.*, and *Turbinaria sp.* were found along the eastern coastal areas.

*Acropora sp.* was found at Station Nos. G2500 and H5000 in water depths ranging from 6.5 to 7.5 meters. The sediments at both stations were characterized as fine to very fine sand.

*Favia sp.* was found at Station Nos. F500 and G500 at water depths of 2 meters. The sediments at these stations were classified as very fine sand to coarse silt and medium to fine sand respectively. *Favites sp.* was observed at Station Nos. E1000, F500, and G500 in water depths of 2 meters. The sediments were of medium to fine sand, very fine sand to coarse silt and fine sand in nature respectively. *Goniastrea sp.* was only observed at Station No. F5000 at where water depth was 7 meters and sediments were composed of fine to very fine sand. *Pocillopora sp.* was found at Station Nos. G500 and G5000 situated in water depths from 2 to 7 meters. The seabed conditions were classified as fine sand and fine to very fine sand. *Turbinaria sp.* was observed at Station Nos. H250, H2500 and H50000 with water depths ranging from 3 to 7.5 meters. The sediments were made up of very fine sand, fine to very fine sand and very fine sand in nature respectively.

## Conclusions

*Acropora sp.*, *Favia sp.*, *Favites sp.*, *Pocillopora sp.*, and *Turbinaria sp.* are the most common coral species found along the coastal areas of Ras Laffan. *Antipathes sp.* and *Goniastrea sp.* were the least common coral species in Ras Laffan

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